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COVER: HM1 Ron Wright of Fleet Hospital 6 in Zagreb, Croatia, is mobbed by excited children at a nearby refugee camp housing people driven from their homes by war in the former Yugoslavia. The hospital provides medical care to U.N. peacekeepers. Story on page 4. Photo by PH2 Kevin Stephens.

Navy Flight Surgeon Saves Lives With Air Force RQS

That Rich Assaf wears a blue uniform as a military flight surgeon is not much of a surprise; many doctors attend medical school through government programs requiring them to accept commissions upon graduation. But having grown up in the shadow of Wright-Patterson Air Force Base near Cincinnati, it certainly surprised many that the uniform he wears is Navy blue and not Air Force blue. The real surprise for the 31-year-old Assaf, now a lieutenant with Patrol Squadron 45 (VP-45) based at Naval Air Station Jacksonville, FL, is that his greatest adventure since his commissioning happened not with the VP-45 Pelicans, but with the pararescuemen of the Air Force's 56th Rescue Squadron (56 RQS) at NAS Keflavik, Iceland.

This was the second time VP-45 touched down for a 6-month deployment to NAS Keflavik since Assaf joined the squadron as flight surgeon, his first permanent command. Assaf knew about the RQS, but wasn't interested in training so much with them during this particular deployment. "I flew with them some last year when I was up here, so I was already familiar with their aircraft and procedures," he said. "When I came back, I didn't feel a huge need to fly with them, so I was flying with my squadron a lot. But I did want to fly with them."

The occasion Assaf decided to join the RQS for a training flight was the one time the training flight didn't go exactly as planned. On the morning of 10 Jan 1994 two of the squadron's HH-60G *Pavehawk* helicopters taxied out on the ramp in preparation for the day's activities when LCOL Jim Sills, the 56 RQS's commander and pilot of Assaf's aircraft, received a change of orders. "I was already in the seat, strapped-up, waiting for them to start their checklist and get into the air," Assaf said, "when LCOL Sills got the message that we were going to do a mission instead. It was passed to me initially that there were six people that needed to be lifted off of a boat; it sounded pretty routine. Supposedly, there were no injuries. The first thing I said was, 'If there are six people needing to be lifted off this boat, do you even want me to go along?' Those helicopters are kinda small—I thought they might need the space. The commander said, 'Yeah, we're definitely going to need you to come along.'"

As the Navy flight surgeon would later discover, the early reports were not 100 percent accurate, and his services would be needed. "It's pretty typical not to get a lot of information," he said, "you usually just get bits and pieces."

The Icelandic rescue tug *Godinn* had been dispatched to Vödlavik, a city approximately 287 miles east of Keflavik, where they were to attach and maintain a tow line to a fishing vessel that had beached before Christmas. The tow line would be maintained until a larger, more powerful Icelandic coast guard cutter could arrive and tow the ship to safe waters. But the harsh Icelandic winter weather was not so cooperative and stranded

PH2 Dave Difuntorum

LT Rich Assaf, flight surgeon for Patrol Squadron 45 stationed at NAS Jacksonville, FL, aboard an HH-60G *Pavehawk* helicopter attached to the Air Force's 56th Rescue Squadron.

Godinn on the rocks, leaving its seven-man crew in a life or death struggle, clinging to hull that was once the ship they knew.

Godinn was not the only vessel hindered by the weather. "We got word that the Icelandic coast guard was turning back because they couldn't make the overland pass—the weather was too bad," Assaf said. "We were flying along the coast. To maintain visual, we stayed low, so it took us 3 to 4 hours to make it to our refueling stop."

According to Sills, they had a 300- to 400-foot ceiling with 2 miles visibility and rain and snow showers when they left Keflavik. As they moved along the southern coast, the ceiling was as low as 100 feet and visibility dropped to almost zero. Add 60-knot headwinds and moderate to severe turbulence, and you've got a picture of the conditions they faced.

"The more you know about the situation, obviously, the better you can prepare yourself," Assaf said. "In this case, we launched and I hadn't brought any supplies that I would need. We normally have a jump bag, which had some things that I would throw on, and the helicopters are obviously loaded up with their own stuff, but since I'm not familiar with what they carry, I usually bring along my own bag. I just tried to clear my mind and say, 'Well, I'll get there and then I'll evaluate the situation.'"

When Assaf's helicopter arrived on the scene, the rescue was already under way. "The first helicopter had gotten to the site because they refueled before us, and they already rescued two people," he said. "The word was the first two people off the boat were in pretty bad shape and they wanted me on the beach. They dropped me off and headed back to rescue the rest of the remaining crewmen."

"It turned out one guy had a medical alert bracelet saying he was a diabetic," Assaf noted. "Here he was, trapped out on a boat without any insulin, without any sugar, under stressful, adverse conditions—he could have been pretty sick. The other guy was older, probably in his mid-50s, and was more affected than the other crewmen by the exposure, even though they were dressed in wet suits and head hoods."

The Icelandic rescue team, Brimrun, had arrived on the scene before RQS helicopters. According to the Icelandic daily newspaper *Morgunbladid,* a Brimrun member, Jon Trausti Gudjonsson, stated how awful it was for the team to stand on the beach helpless. "That feeling cannot be described in words," he said. As the RQS moved the members of *Godinn*'s crew to the shore, Brimrun was able to assist. Once Assaf landed, they were able to assist him.

"The Icelandic team had a mug of hot coffee they were giving the survivors," Assaf said. "The older survivor didn't speak English very well; fortunately one of the rescue team members spoke very good English, and I worked through him to find out if these guys were making any sense. With hypothermia, when they're losing consciousness, it's important to determine if they know where they are and if they're coherent. The guy told me they were cold and tired and shivering. A good sign was that they hadn't lost their ability to shiver. They were only suffering from mild—the older gentleman was maybe pushing toward moderate—hypothermia."

Hypothermia was not the doctor's only concern. "I was more concerned about the diabetic in the long-term," he said. "He was OK for the time being, but in the next few hours would need sugar and more extensive care, more than what we could provide."

Out at the rescue site, Sills and his counterpart in the other *Pavehawk,* CAPT John Blumintritt, were having a difficult time maintaining a hover over the capsized tug. Flight engineers Senior Airmen Jeff Frembling and Airman 1st Class Bill Payne proved their worth determining a viable hover position, out of the churning waves and exposed antennas.

Sills remembered that even with the large waves, the ship wasn't pitching up and down—it was wedged on the rocks. If there had been a lot of movement, he said, they would have had some big problems.

Senior Airmen Jesse Goerz and Matt Wells had their work cut out for them. The two pararescuemen were lowered slowly, one at a time, to pull off the remaining crewmen. They counted six crewmen total; a seventh crewmember had been swept over earlier and drowned.

Gudjonsson conveyed to *Morgunbladid* that in his opinion, the survivors' ability to tie themselves firmly to equipment on top of the bridge was what saved them. He explained that they used strong thongs fitted to their float suits. Without the thongs, they wouldn't have been able to endure the breakers that washed over them almost constantly.

"They had good gear, which is probably why they were able to survive," Assaf said. "I have a lot of respect for those Icelandic crewmen who go out in the middle of January to do their job. Obviously their ancestors had centuries to learn how to prepare for it. That probably is what saved their lives, more than anything. It's unbelievable to think that they held on out there for 8 hours.

"I went to talk to them, and they were in great spirits!" he continued. "They were happy to be on the ground, safe and sound. I judged that those four people wouldn't need to come

JO2(AW) Natalie Dias

U.S. Ambassador to Iceland, Parker W. Borg, and Commander of the Iceland Defense Force, RADM Michael D. Haskins, welcome Dr. Assaf and members of the Air Force's 56th Rescue Squadron as they return to NAS Keflavik following their successful rescue mission. From left: Borg, Haskins, SSGT Greg Reed, Airman 1st Class Bill Payne, Assaf, Senior Airman Matt Wells, Senior Airman Jesse Goerz, LCOL Jim Sills, LCOL Gary Copsey, CAPT Gary Henderson, Senior Airman Jeff Frembling, and CAPT John Blumintritt.

with us to the clinic. A man with the Icelandic rescue team said there was a house about a kilometer away where they'd get them into dry clothes."

As for the flight crews and the two Icelanders in more serious condition, there was still plenty of adventure ahead. Brimrun had recommended a hospital at Egilsstadir, about 40 miles inland, but the weather turned them back with only 15 miles to go. Sills and Blumintritt turned around and headed to the coast. They had hoped to return to Höfn, where they had refueled on the trip up, but the relentless weather refused to cooperate. "At times we completely lost sight of the bird in front of us, and we were only about a quarter mile behind," Sills said.

"I didn't know we turned around because I wasn't paying attention," Assaf remembered. However, he knew it was only supposed to be about a 5-minute trip, and that when 15 minutes had passed, something was wrong. "I asked for an ETA (estimated time of arrival), and was told we didn't have one because we didn't know where we were going," he said. He became increasingly concerned due to the critical need for insulin for the diabetic.

Sills explained that the team passed a mile south of Neskaupstadur when they decided they couldn't advance any more against the weather, so they turned around and went back to Neskaupstadur. "We remembered from previous experience that they had a clinic there," he said, "but we didn't recall an airport. At this time, we were only concerned with getting the aircraft safely on the ground."

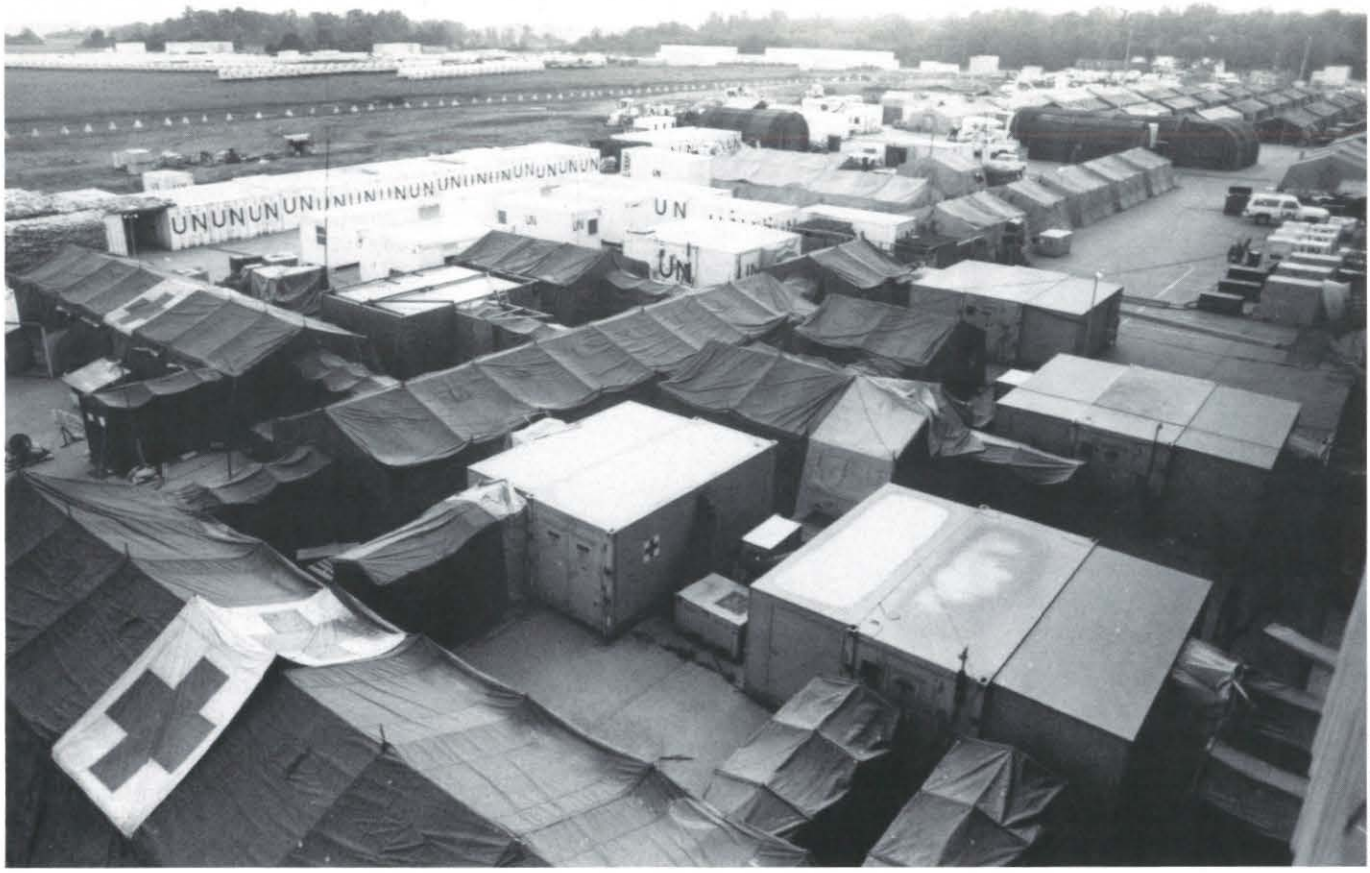
"We ended up landing in a downtown parking lot," Assaf said. "The other helicopter again landed first, and the pilot instructed someone to get an ambulance, so by the time we landed, we were able to get them into an ambulance immediately and shoot them off to the hospital. The next morning, both of them had been released. The older guy, the one I was most concerned about, walked up, shook my hand and said 'thank you' in Icelandic."

By the time the team had returned to NAS Keflavik 2 days after their departure, the rescue had become the top story throughout the small north-Atlantic country, and Assaf, along with the members of the 56 RQS rescue team, had become national heroes. "I don't think any of us knew how big it was, or how big it had grown into," Assaf said. "When we arrived, the base public affairs officer met us and said to expect a media circus." When the crew entered the familiar hangar they knew as home, they were greeted by U.S. Ambassador to Iceland Parker W. Borg, RADM Michael D. Haskins, commander of the Iceland Defense Force, representatives of the U.S. military and Icelandic media, and the families of the 56 RQS. "We walked in unshaven," Assaf said, "hadn't showered in 2 days, had a long flight back wearing the same clothes we left in—presenting a little bit of a grungy appearance."

The 2-day mission not only made heroes out of the entire team, but friends as well. "I flew with them just a few days ago," Assaf said. "I got over there and they said, 'OK, Doc—what mission are we going to go on this time?' This time, I brought my bag—I learned from experience."

And the Navy flight surgeon who grew up in the shadow of Wright-Patterson Air Force Base has a renewed respect for the men whose uniforms are a slightly different shade of blue. "The people who deserve a medal out of this were the people who flew and landed us safely," he said. "I have the greatest respect for the pilots and the three pararescuemen. They deserve whatever they get out of this." ❑

—Story by JO1 David W. Crenshaw, Iceland Defense Force Public Affairs.



PH1 Mark Therien

Treating Casualties at Fleet Hospital Zagreb

Since Fleet Hospital Zagreb stood up in March 1994, surgeons, nurses, corpsmen, and other members of the Fleet Hospital Zagreb team have admitted and provided emergency care for 16 victims of mine detonations, some of whom were severely injured. And that's in addition to caring for over 2,500 patients suffering from illnesses and trauma injuries from other causes. The fleet hospital is located on Camp Pleso, about 7 miles south of Zagreb, Croatia. It provides medical service for nearly 36,000 troops from 34 countries assigned to the United Nations Protection Force throughout the Former Republic of Yugoslavia.

Before leaving on their 6-month deployment, the fleet hospital personnel, most from Naval Medical Center (NMC) San Diego, CA, trained together for 9 days in January at Camp Pendleton, CA. Preparing a team ready to handle anything, they concentrated on mass casualty drills and caring for the critically injured. In Zagreb, they have put their well-honed skills and team-building training to work.

Incoming

"Normally, a patient has already received at least some care before arriving here," said LT Karen L. Sites, emergency room nurse, explaining that most contingents have primary care physicians and some even have surgical teams. In the case of some very bad injuries, initial surgery may already have been performed by a team of doctors.

The emergency room typically has plenty of advanced warning about a patient who will be medevaced, explained Sites, an emergency room nurse at her home station, NMC San Diego. On occasion, volunteers from the hospital even accompany the aircraft to the patient's location. Still, emergency room people are ready at all times in case a short-notice case arrives from, for example, a contingent on Camp Pleso.

Left: **Fleet Hospital 6, in foreground, is part of a tent city in the American sector of Camp Pleso. The groups of three conex boxes in the lower right corner are operating rooms.**

HM2 Wallace A. Honer, the leading petty officer for the emergency room, said that in addition to getting some advance notice of a medevac arrival, sometimes they get a full report on what to expect. At other times they get only basic information, such as someone has been injured by a mine detonation.

Most of the trauma wounds are caused by mines. Fortunately, some of the injuries have been relatively minor. However, mines often cause severe soft tissue damage and there have been many serious cases. One patient arrived with most of his buttocks and part of his lower back torn away and another suffered amputations of both legs.

In most cases, someone accompanies the patient, either a medic with the evacuation team or a member of the patient's contingent. These people, most of whom speak English, are usually able to explain what kind of treatment and medication were already administered to the patient. Often they remain at the hospital until their companion is released.

Treatment

The emergency room personnel first determine if the patient's breathing, blood pressure, and pulse are within acceptable ranges. Most patients already have had resuscitation or lifesaving procedures done because it generally takes casualties 12-24 hours to reach the fleet hospital, explains LCDR James R. Swegle, the hospital's primary trauma surgeon. Once any life-threatening injuries are ruled out, personnel from the emergency room, surgery, orthopedics, and anesthesiology work together to evaluate the injury and the patient's condition. The team's primary job is to determine what needs to be done next.

"Although these patients usually don't need emergency procedures, in the first day here we do take them into the operating room, especially with the mine injuries," said Swegle. "We want to wash out the wounds and explore them ourselves so we know exactly what was injured and what we're dealing with." The majority of blast-injury patients are taken from the emergency room right into surgery, the exceptions being those who require further stabilization due to significant blood loss.

A general surgeon and an orthopedic surgeon work together to cut away dead tissue from the wounded area so uninjured tissue can heal. A pulse lavage is used to "power wash" the wound and to clean away deep imbedded fragments and dirt to help prevent infections.

"The first time in, you wash out the wound and debride, or cut away tissue that is severely injured or dead," said Swegle. "Tissue you're not quite sure about, you leave alone. Then, a day or two later, you go back in and see if that piece of tissue you thought might survive did. If it didn't, you debride that and wash the wound out again.

"Once you've done that two or three times and you've taken out all the tissue that's dead or going to die, you're left with fairly healthy tissue. Then you start thinking about how you're going to get skin or muscle closed over the wound to get it to heal," he explained. When possible,

PH1 Mark Therien

Russian Private Dmitri Gluhoski, victim of a land mine, shows the wounds in his other leg to LCDR Kerry Thompson, MSC, Fleet Hospital 6's head of physical therapy. Gluhoski will soon be fitted for a prosthetic device.

PH1 Mark Therien

British LGEN Sir Michael Rose, commander of U.N. forces in Bosnia, chats with the commanding officer of Fleet Hospital 6, CAPT James Johnson, MC (right), and his staff. *Right below:* On his recent visit to Zagreb, VADM Donald F. Hagen, MC, Navy Surgeon General, confers with LTJG K. Coons, MSC, supply officer at Fleet Hospital 6.

the wound is closed. Sometimes, for very deep injuries, wounds must be left open to heal from the inside out to prevent deep infections.

LT Carolyn E. Gardner, operating room nurse, explained they are here simply to save lives, and where possible, limbs. Plastic reconstruction is not done. Patients who need reconstructive surgery are stabilized and, in most cases, returned to their home country for further care.

Post-op

Either just before the surgery is completed, or as soon as it is over, the operating room nurse compiles the details of the surgery and all available background on the patient in order to brief the intensive care nurse before the patient is transferred to the intensive care unit (ICU). The nurse also relates the patient number, nationality, and whether or not the patient speaks English. Details of the surgery, what kind of anesthesia, and whether or not the patient will be on a ventilator or need oxygen are also discussed. Fluid intake and output are noted, as are blood transfusions, special intravenous tubes and any kind of drains. The more information gathered and passed on at each stage, the better care can be given to the patient explains LCDR Joan R. Atchison. Atchison is the intensive care division officer here and at her home duty station, NMC San Diego.

"One of the most important things we try to find out is what the patient is usually called. People respond better to their first name. It provides some familiarity when they are waking up, which is a very critical time," said Gardner.

ICU is used as a recovery ward at the hospital and patients typically are transferred to the inpatient ward as soon after surgery as possible. On average there are about 12 inpatients at any one time, so the nurses are usually able to perform ward and ICU functions simultaneously without having to keep ICU manned. The setup typically calls for a critical patient to be situated directly across from the nurses' station where the nurses and corpsmen can keep a close watch over him. When two or more critical patients are present, manning the ICU becomes necessary.

The Language Problem

At the point when a patient enters the ICU or ward, the language barrier, which may not have been a problem up until then, can complicate care.

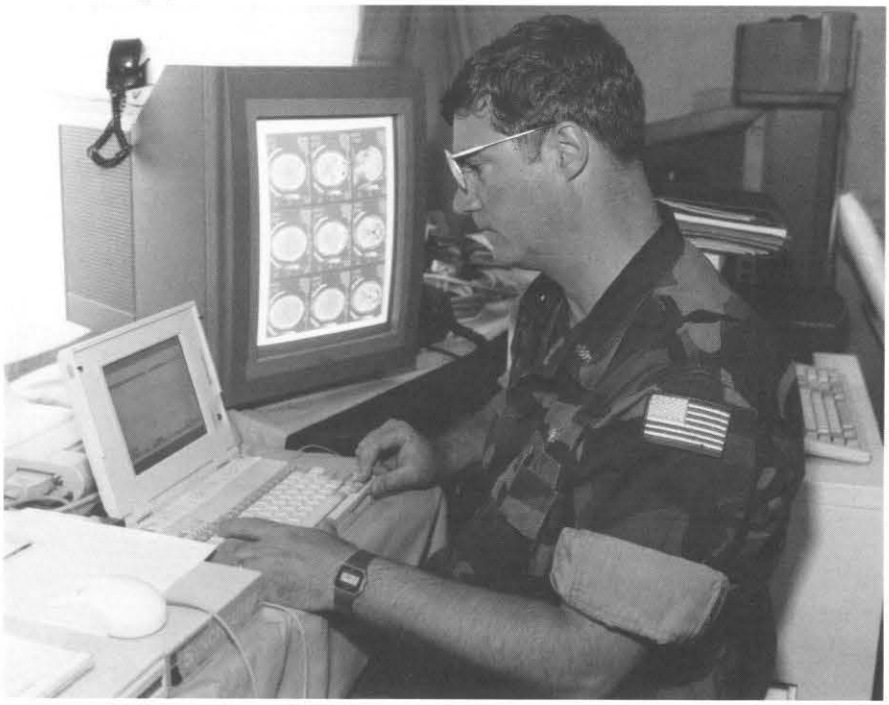
"In the first hour or two a patient is here, the communication problem is usually not a factor," explained Swegle. "There's not a lot of explaining you can do to a severely injured

CAPT Perry Bishop, BUMED Public Affairs

patient even if you can speak their language, other than to try to reassure them by smiling and patting them on their arm or shoulder." He also discovered that most patients understand "OK" or "good" regardless of their language, and the doctors, nurses, and technicians use these words to try to help alleviate any fear.

More communication problems arise later on, though, when the patient becomes more stable and coherent. The difficulties become readily apparent when medical personnel attempt to explain what happened during the surgery, what will happen in the next couple of days, what the patient should expect, and whether or not he'll ever be able to walk again. Making sure the patient understands is extremely important.

MSGT Charlie Morgan, USAF



LTJG James Martin, MSC, displays Fleet Hospital 6's teleradiology capabilities.

"It can be difficult when you have to go through an interpreter and sometimes they might lose the meaning of what you want to get across," said Swegle. Moreover, the patient's questions don't always quite make it through clearly either.

The Pyschiatrist

Another person acutely interested in good communications with the patients is the fleet hospital's psychiatrist, LCDR Kathleen A. Frechen, who is also permanently stationed in San Diego. Her primary duty is to help patients through their immediate reaction to acute trauma.

"I can deal with things on a more immediate basis here," said Frechen. She added, "But obviously, as the patient goes through rehabilitation, his psychological rehabilitation becomes more the province of the people who take care of him down the road.

She also has encountered difficulties in talking with casualties from different nations. She has found that in many cases, those who accompany patients and translate for them turn out to be their colleagues. Stating a particular case, Frechen mentioned a 19-year-old Russian private, Dmitri Gluhoski, whose leg was amputated just below the knee as a result of a mine injury.

"I think it was easy to deal with him in terms of making sure his wound was clean and making sure that infection didn't set in. But we were aware he was looking depressed and there was no way at first of really reaching him, no way of trying to get at what was going on with him emotionally," said Frechen. However, another Russian patient then took him under his wing and made sure this young kid's needs were met. The other patient was the liaison with the rest of the staff.

Frechen also helps the staff cope with the results of traumatic injuries. She explained that, while hospital people are used to seeing traumatic injuries, they sometimes have problems dealing with a patient's reactions to his injury. The young Russian soldier was among the first in a wave of mine victims close together which took an emotional toll on people. Frechen helps the caregivers deal with these stresses, and sometimes it's as easy as giving them "permission to talk about their feelings," she said.

Recovery

Ministering to critically injured patients is a situation where everyone works together to ensure the best possible patient care. And sometimes this carries a little further than immediate emergency or follow-on care. Since the field hospital is relatively small, emergency caregivers are able to follow and participate in a patient's recovery, something they usually can't do in a large hospital.

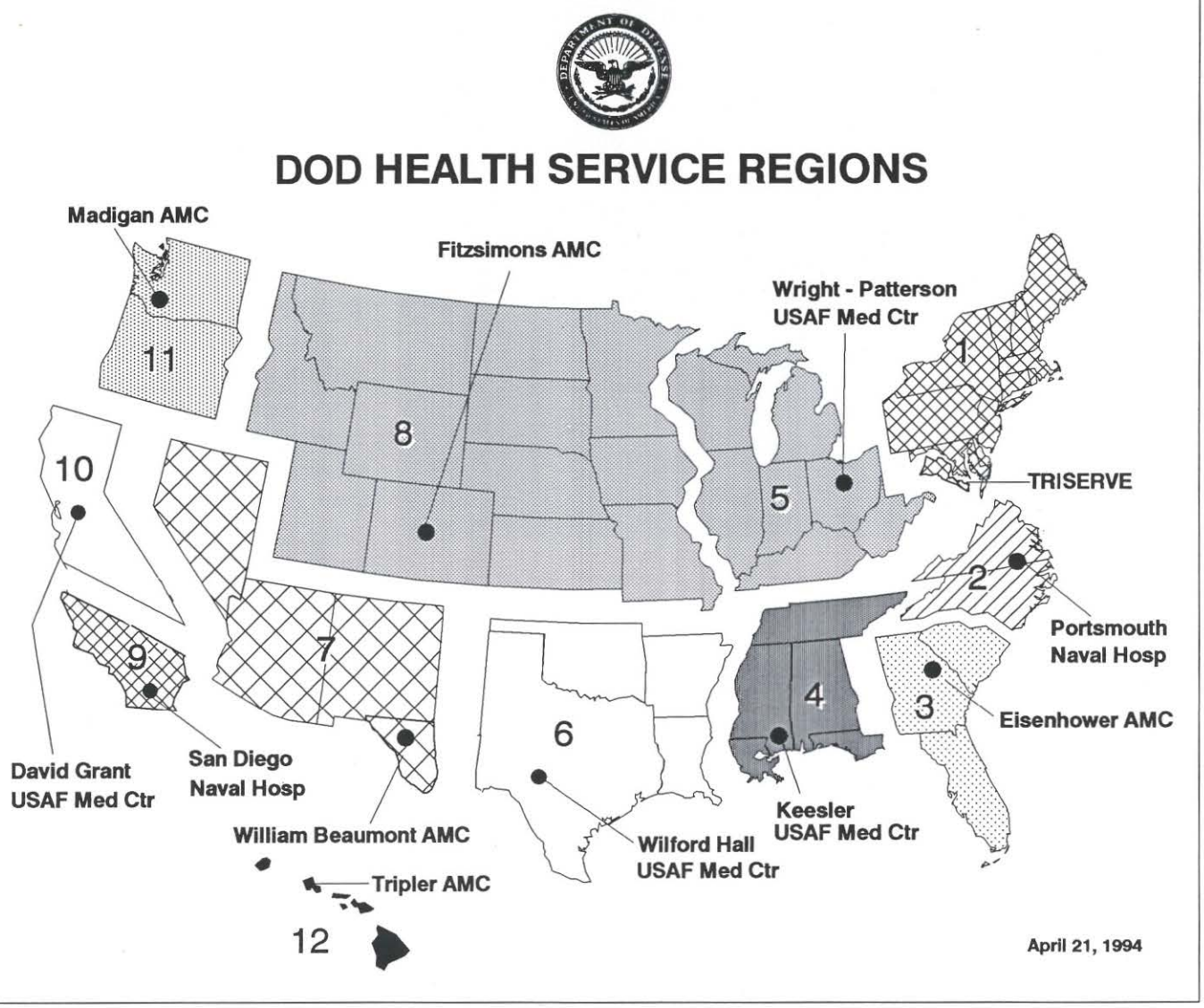
As the young Russian moved from the ICU to the ward to a wheelchair and now to crutches, many of the hospital's staff have devoted time to taking him around camp, wheeling him to the club for a short while in the evening or taking him to the camp volleyball games on sunny Sunday afternoons. They expect he will be with them right up until he is fitted with a prosthetic device and receives associated physical therapy.

This undoubtedly helps the caregivers as much as its helps him. Now he is smiling and laughing, and although he still has a long road ahead of him, he knows people here care.

"In this environment, we get to see that what we've done is doing some good," said Gardner. "It's nice to see patients get better." ❑

—Story by MSGT Charlie Morgan, USAF, United Nations Protection Force Headquarters, Joint Task Force Provide Promise, Zagreb, Croatia.

FIGURE 1



Features

TRICARE

DOD Health Care Reform:

A Basic Program Overview

CAPT Steven R. Lamar, MSC, USN

The Military Health Services System (MHSS) is undergoing major change—driven by the momentum of national health care reform—affecting both the health care options available to our beneficiaries and some of the functions and organizational structures of the military services' Medical Departments. This Department of Defense (DOD) health care reform program, known as TRICARE is designed to ensure the most effective execution of the military health care mission, ensure

access to a quality health care benefit, control health care costs, and respond to changing military and national health care priorities. With a rapidly changing health care delivery environment come inevitable confusion, uncertainty, and apprehension, not only from our beneficiaries but from members of our health care team. This article is intended to describe the basic features of DOD health care reform initiatives as defined by the Office of the Assistant Secretary of Defense for Health Affairs (OASD/HA), address implementation plans for the major reform components, and provide factual programmatic information as we know it today in this ever-changing health care environment.

Current DOD Health Services System

Historically, health care services for DOD beneficiaries have been provided by military treatment facilities (MTFs) operated by the military departments. By definition, the first priority for MTF care is the active duty population. All other DOD beneficiaries may receive MTF care on a "space available" basis. Since 1966, with the inauguration of the Civilian Health and Medical Program of the Uniformed Services (CHAMPUS), nonactive duty beneficiaries (under age 65) have been able to receive health care from civilian sources (when not available at the MTF) and cost share the expense of that care with the DOD through the auspices of the CHAMPUS program. In FY93 approximately 8.7 million people were eligible for DOD health care benefits, including 1.9 million active duty personnel, 2.7 million dependents, and 4.1 million retired military personnel and their dependents and survivors. From Operations & Maintenance (O&M) funds, CHAMPUS expenditures in FY93 approached $3.5 billion, nearly as much as was spent on nonactive duty beneficiaries in the "direct care" (MTF) system ($3.9 billion). Over the last few years, a variety of options to the MTF and CHAMPUS systems have been implemented, including the CHAMPUS Reform Initiative (CRI) demonstrations, Base Realignment and Closure (BRAC) site managed care initiatives, Tidewater Virginia (coordinated care) demonstration project, PRIMUS/NAVCARE clinics, and most recently, the Managed Care Support Contract for California/Hawaii. Approximately two dozen different health care delivery programs, many with different benefit structures and associated fees, have been attempted under the DOD health care program to test the best methodology for delivering a consistent and cost-effective health care benefit to DOD beneficiaries.

Why Do We Need DOD Health Care Reform: What Is the Problem Requiring a Solution?

Clearly, much of the initiative for DOD health care reform is an extension of the President's National Health Care Reform Plan. However, a variety of factors combine to explain the logic behind DOD health care reform actions: uneven access to care, overcrowding in the MTFs, maldistribution of health care resources, duplication of effort among military medical services, lack of a standardized health benefits package, escalating health care costs, decreased DOD funding levels, and beneficiary confusion concerning available health care options. Additionally, downsizing of military end strength and concomitant base realignment and closure actions—including MTF closures—continue to strain MTF capabilities and limit "space available" care opportunities for nonactive duty beneficiaries.

Figure 2

***TRICARE* Program Goals**

The *TRICARE* program is based on the following goals:

* **Improving beneficiary access to care**
* **Assuring the security of a high quality, consistent health care benefit for all MHSS beneficiaries, at low cost**
* **Preserving choice for all nonactive duty participants**
* **Containing overall DOD health care costs**

Source: Reference (3)

With the ever-increasing shift of work load to the CHAMPUS environment as a result of declining MTF capabilities, seeking alternatives to the "Standard CHAMPUS" program (with its inherent cost-shares, copayments, and deductibles) is an obvious and responsible action. Given the demonstrated cost-effectiveness of coordinated care/managed care delivery systems in the private sector, DOD has chosen to follow a similar course—thus the "birth" of TRICARE.

The TRICARE Regional Managed Care System

In 1993, DOD added several new components to its health care program—beginning the transition to a managed care concept of operations:

(1) Establishment of 12 Health Service Regions (HSRs) within the United States, each headed by a medical center commander designated as a Lead Agent (Figure 1).

(2) Development of the "Triple Option" managed care program structure for CHAMPUS-eligible beneficiaries:

* TRICARE Prime: Health Maintenance Organization (HMO) Option
* TRICARE Extra: Preferred Provider Organization (PPO) Option

Figure 3

TRICARE Prime Beneficiary Payments

* No Deductible

* Annual Enrollment Fee

Active Duty Member: -0-

E-4 & Below Family Member(s): -0-

E-5 & Above, one Family Member: $35.00

E-5 & Above, two or more Family Members: $70.00

Retired Members/Family

Retiree: $50.00

Retiree & Family: $100.00

* Copayments (None in MTF)

Routine Office Visits

E-4 & Below Family Member: $5.00 per visit

E-5 & Above Family Member: $10.00 per visit

Retiree & Family Members: $15.00 per visit

Specialty Care Visits

Varies by specialty care received and beneficiary rank/status

Range from $5.00 per visit (home health care) to $75.00 per visit (same day surgery)

Inpatient Hospitalization (Medical/Surgical)

Active Duty Family: $9.30 per day or $25.00 (whichever is greater)

* Retiree & Family: $125.00 per day to a $1,250.00 maximum per admission; plus 20% cost-share of separately billed professional charges

* Amounts currently charged in BRAC sites and future TRICARE contracts (Currently in California/Hawaii: $75/day; $750 maximum/admission; No cost-shares of professional charges).

Source: Reference (3)

* TRICARE Standard: Standard CHAMPUS (basic indemnity) Option

(3) Implementation of a fixed price at-risk TRICARE Support Contract to operate within each Health Service Region—augmenting MTF care through an established network of civilian providers and providing fiscal and administrative support to Lead Agents for care purchased through these networks.

(4) Transition to a "capitation-based" method for allocating health care funds to the military departments. TRICARE program "Goals" are defined in Figure 2.

The "Triple Option" (TRICARE) Plan

The backbone of the TRICARE program is a "triple option" concept of health care delivery for CHAMPUS-eligible beneficiaries. Beneficiaries may choose from the following options:

(1) TRICARE Prime: Participants in this program will enroll in an HMO-like plan, obtain their care from a network of civilian and military providers/hospitals, and pay an annual enrollment fee and reduced CHAMPUS cost-shares and copayments (Point-of-Service charges) defined in Figure 3. Enrollees will have access to enhanced preventive care services under this plan and will have a Primary Care Manager (PCM) responsible for coordinating required patient referrals for care within the MTF or the civilian provider network. A Point-of-Service option will be provided under TRICARE Prime, allowing enrollees to "go outside the provider network" for care, but requiring payment of significant cost-shares and deductibles which could exceed Standard CHAMPUS costs (policy under development at the OASD/HA). Additionally, participants will be relieved of claim filing responsibilities (claims filed by providers).

(2) TRICARE Extra: Participants in this program will not enroll (no enrollment fee) and will obtain care from providers of their choice within the established civilian network (contracted with the government at a discounted rate). Beneficiaries will not have to file claims (provider filed) and will benefit from lower cost-shares than required by the basic CHAMPUS program (TRICARE Standard).

(3) TRICARE Standard: Participants in this program enjoy unrestricted provider choice, pay no enrollment fees, but are required to pay annual deductibles and more costly copayments and cost-shares (compared with the first two options). This program is the basic CHAMPUS standard indemnity fee-for-service plan. Beneficiaries who use network providers will benefit from the reduced cost-sharing provisions of TRICARE Extra.

The "Lead Agent" Concept

As previously stated, the establishment of 12 Health Service Regions within the United States, each with a designated Lead Agent MTF/Commander, is a critical component of the DOD health care program. Lead

Agents, working cooperatively with all the Services' regional MTF commanders and their staffs, will be directly responsible for the development, implementation, and management of the regional health plan for their MHSS beneficiaries, including the development of an integrated health care network within their Health Service Region. A Managed Care Support Contract, centrally procured by the Office of Civilian Health and Medical Program of the Uniformed Services, will provide the civilian provider network to augment MTF direct care capabilities as governed by regional health care priorities. Figure 4 lists Health Service Regions/Lead Agents, populations served, and the numbers of MTFs per Service in each region. Major responsibilities of the Lead Agents are defined in Figure 5. MTFs within each HSR retain their Service-designated chain-of-command irrespective of their Lead Agent's Service affiliation. Each Service will retain existing authority to make decisions regarding direct care (MTF) operating funds, facility maintenance, and personnel actions. Clearly, the success of this program will be ultimately dependent on the Services' willingness and ability to work together cooperatively to ensure efficient and effective execution of the regional health plan.

Figure 4

Regional Lead Agents/MTFs and Supported Populations

			MEDICAL TREATMENT FACILITIES			
HSR	Lead Agent	Population	USA	USN	USAF	TOTALS
Region 1	National Capital*	1,093,918	5	6	4	15
Region 2	Portsmouth (USN)	872,011	3	3	2	8
Region 3	Eisenhower (USA)	1,063,770	4	4	5	13
Region 4	Keesler (USAF)	595,024	3	2	5	10
Region 5	Wright-Patterson (USAF)	653,328	2	1	3	6
Region 6	Wilford Hall (USAF)	949,778	4	1	9	14
Region 7	William Beaumont (USA)	396,332	2	0	6	8
Region 8	Fitzsimons (USA)	732,821	5	0	9	14
Region 9	San Diego (USN)	710,461	1	3	3	7
Region 10	David Grant (USAF)	382,590	1	2	4	7
Region 11	Madigan** (USA)	350,439	1	2	1	4
Region 12	Tripler (USA)	151,750	1	0	0	1
TOTALS:		7,952,222	31	23	54	107

* The National Capital Region will functionally carry out this policy through a "Tri-Service Board" with annual rotation of the chairperson. The contract responsibility for the board will be carried out by Walter Reed Army Medical Center.

** Alaska is a free-standing entity and will develop referral patterns with appropriate medical centers.

Source: Reference (3)

TRICARE Managed Care Support Contracts

A significant component of the TRICARE program involves the purchasing of health care and support services from civilian providers through a contract vehicle for each of the 12 Health Service Regions. In some cases, a single contract will be awarded for services to be provided within multiple (combined) regions (i.e., single contracts will be awarded for each of the following combinations of HSRs: Regions 2 and 5, Regions 3 and 4, Regions 7 and 8, Regions 9, 10, and 12). The transition from an exclusive fee-for-service (basic CHAMPUS) program to the TRICARE Triple Option Plan as described is now under way and is to be completed within the next 3 years. The schedule for commencement of contracted health care services for each Health Service Region is shown in Figure 6. It should be noted that a Managed Care Support Contract is currently in place in the California/Hawaii area (Regions 9, 10, and 12). The February 1995 "Triple Option Availability" dates indicated for these regions (Figure 6) refers to the *new* start work date for a similar contract now under recompetition. These fixed-price at-risk contracts will be procured centrally by OCHAMPUS, with extensive participation of Lead Agent and the Services' staffs, and will assist Lead Agents and MTFs in improving access to quality health care and controlling health care costs. The primary functions of a TRICARE Managed Care Support Contract are listed in Figure 7.

Figure 5

Major Responsibilities of the Lead Agents

* **Develop a Regional Health Services Plan and annual updates in coordination with regional MTF commanders.**
* **Develop clinical support contingency plans in concert with regional medical facilities, reserve units, and the *TRICARE* Support Contractor.**
* **Ensure the regional health services delivery plan contains a Continuous Quality Improvement component.**
* **Develop regional *TRICARE* Support Contract requirements within the framework of overall DOD policy.**
* **Develop procedures for coordinating health care delivery between military and civilian health care providers in the region.**
* **Monitor CHAMPUS budget targets.**
* **Coordinate utilization management and quality assurance activities.**
* **Establish priorities for routing beneficiaries to the direct care system.**
* **Determine the level and cost of *resource sharing* between MTFs and the *TRICARE* Support Contractor throughout the region.**
* **Develop regional policy for coordinating patient referrals and issuance of non-availability statements (NAS) in accordance with DOD policy.**
* **Designate and maintain the regional Specialized Treatment Services (STS) program for certain resource intensive clinical services within the region.**
* **Coordinate the development of an annual regional capitalization, maintenance, repair and renovation plan for all MTFs within the HSR in concert with regional MTFs.**
* **Oversee efforts to disseminate information about the *TRICARE* Program to beneficiaries and direct care and contractor staff.**
* **Conduct ongoing evaluations and coordinate corrective actions relative to resource utilization, clinical services, and access as appropriate.**
* **Coordinate the development of a region-wide information systems modernization plan for all MTFs within the HSR.**

Source: Reference (3)

Specialized Treatment Services

CHAMPUS beneficiaries in need of certain highly specialized high-cost medical care will be referred to a specifically designated national or regional military or civilian treatment facility—Specialized Treatment Services (STS) facility. The specific types of care to be covered and the sites at which specialized care must be obtained will be announced annually by the OASD/HA. The designation of an STS will be based on readiness, access, quality, and cost considerations. Lead Agents may designate regional STSs as a component of their regional health plans. An MTF commander can withhold a non-availability statement (NAS) based on the availability of care at designated STS sites.

Capitation Budgeting

One reason for implementing the TRICARE program is to control health care costs and optimize the use of all MHSS resources. Capitation budgeting is a recognized strategy for health care cost containment. Under this concept, each MTF commander is responsible for providing health care services to a defined population for an average fixed amount per beneficiary. This capitation methodology minimizes inappropriate increases in health care services and reduces the unnecessary provision of more costly care that is not clinically appropriate, since there are no associated financial incentives for workload inflation. Financial incentives do exist to provide care in the most cost-efficient manner possible through the careful monitoring of the volume of provided services, efficient delivery of care per episode, and use of preventive (wellness model) services. Capitation discourages inappropriate hospital admissions, excessive lengths of stay, and unnecessary care. DOD health care resource allocations are based on a two-step process:

(1) Allocations from the OASD/HA to the Services of CHAMPUS dollars, direct care (MTF) "operation & maintenance" (O&M) funds, and military personnel resources using a financially-based modified capitation methodology. Calculation of the CHAMPUS allocation to the MTFs in regions with functional TRICARE (Managed Care) Support Contracts will be performed by the OASD/HA.

(2) Allocation from the Services to each of their MTFs based on a modified capitation methodology designed by each of the Services to meet its unique requirements.

National Health Care Reform Interface

The TRICARE program is designed to be compatible with the future implementation of National Health Care Reform options. TRICARE may ultimately become

Figure 6

Triple Option Availability Dates by Region

HSR	Lead Agent	Triple Option Available *
Region 1	National Capital (TRISERVE)	May 1997
Region 2	Portsmouth (Navy)	May 1997
Region 3	Eisenhower (Army)	May 1996
Region 4	Keesler (Air Force)	May 1996
Region 5	Wright-Patterson (Air Force)	May 1997
Region 6	Wilford Hall (Air Force)	Nov 1995
Region 7	William Beaumont (Army)	Nov 1996
Region 8	Fitzsimons (Army)	Nov 1996
Region 9	San Diego (Navy)	Feb 1995
Region 10	David Grant (Air Force)	Feb 1995
Region 11	Madigan (Army)	Mar 1995
Region 12	Tripler (Army)	Feb 1995

* Current as of May 1994

Source: Reference (6)

Figure 7

Primary Functions of the *TRICARE* Support Contracts

* Development of civilian provider networks in support of both the *TRICARE Prime* and *TRICARE Extra* benefits
* Claims processing and data collection
* Utilization management and quality assurance
* Patient routing and referral
* Beneficiary services
* *TRICARE Prime* program enrollment
* Provider and beneficiary education
* Marketing

Source: Reference (3)

one choice for DOD beneficiaries from a menu of other health care options available to all citizens and would compete with these other plans for the DOD beneficiary business. Irrespective of the availability of National Health Care Program options, TRICARE will significantly expand managed care health care delivery to our CHAMPUS-eligible beneficiaries throughout the Military Health Services System, providing a secure and consistent health care benefit. For other than active duty beneficiaries, the program will preserve the freedom of choice available through the "Triple Option" plan. As beneficiaries and members of our Navy health care team experience the inevitable changes to our health care system brought about by the implementation of the TRICARE program, it remains our individual and collective responsibility to do our best to ensure that our customers continue to receive the high-quality health care so universally provided by Navy medicine throughout our history. Yes, these are times of change, but also times of opportunity. By working together, sharing ideas, being innovative, and striving to find solutions (not just identifying problems), we can make the best of these opportunities for the mutual benefit of our beneficiaries, our individual career goals, and the future of Navy medicine.

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Although the factual information defined in this article was extracted from DOD/OASD(HA) references, the opinions expressed are those of the author and do not necessarily reflect the formal position of either the DOD or the Department of the Navy.

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Competency-Based Performance Development

CDR Christopher L. Laurent, NC, USN
CDR Charlene R. Johnston, NC, USN
LCDR Mary C. Greenwood, NC, USN

With the health care reform wave sweeping the country military treatment facilities (MTFs) have been under scrutiny to determine their ability to be cost-effective. An example of this is the use of the Prospective Payment System to set cost limits within MTFs. Many commanding officers and nursing directors are faced with reduced budgets. Nursing staff development has not escaped the impact of these budget reductions. Orientation, training, and education of registered nurses (RNs) is a costly necessity, and nursing administrators must explore multiple options to reduce this cost while continuing to insure the competency of the nursing staff.(1)

As a key element of staff development, nursing orientation is a critical component of the acculturation of all RNs who report to a MTF. Generally, orientation for nurses consists of two programs: (1) Command Orientation and (2) Clinical Nursing Orientation. Both are necessary to comply with standards set by the Joint Commission on Accreditation of Health Care Organizations (JCAHO).(2) In addition, JCAHO requires that the competency of nurses be objectively validated. Competency in nursing can be defined as successful integration of technical, interpersonal, and critical thinking skills.(1,3)

Within the standard for education, JCAHO addresses the required content for orientation programs. The Command Orientation program should give new personnel a broad-based overview of the command's function and policies in a very short time. The intent of this standard is to require a facility to give generic information on a myriad of topics, such as review of the physical plant, mandatory fire and safety training, cardiopulmonary resuscitation validation, infection control updates, military rights and responsibilities, etc. With completion of this component of orientation, new personnel should have basic working knowledge of how the organization functions.(2)

The Clinical Nursing Orientation component, in most MTFs, focuses on skills validation. Usually, all RNs receive a standardized orientation program without consideration for individual knowledge or expertise. As such, RNs possessing competent performance skills are provided with redundant or unnecessary training.(4)

Competence becomes a key issue and is addressed by JCAHO in several nursing care standards. JCAHO outlines not only a requirement that RNs be competent, but that the facility have a tool for objective measurement of that competence.(2) Graduation from an accredited nursing program does not guarantee that new nurses as graduates are competent to practice nursing.(5) Frequently administrators have assumed that because nurses have completed appropriate educational and licensure requirements, and organizational orientation, they possess the ability to make appropriate clinical decisions and judgments. This is an inaccurate assumption.(6) Yet, based on the present methods of orientation and staff development, nurses may appear competent at the time of employment. This has generally been documented with evidence that the nurse completed an orientation.

A subjective standardized "check-off" sheet is utilized to document completion of certain technical skills. The other elements involved in the definition of competency, critical thinking, and interpersonal skills, are frequently not validated in any form other than a subjective, process-oriented performance evaluation. The cost of traditional orientation has been estimated at $3,800 per RN.(7) This is a costly expense for a program that fails to meet JCAHO requirements and does not provide objective evidence that the nurse is competent.

How is RN competency efficiently and accurately evaluated in compliance with the JCAHO standards? What is adequate? Nursing administrators have struggled with this paradox for many years. Different strategies have been utilized to address the problems of cost-effective staff development and validation of competency. Most involve changing the elements of orientation. Times are shortened, topics added, topics eliminated, "check sheets" for experience developed, etc. Yet without alter-

ing the methodology, the results and cost remain unchanged.(5) The challenge has been to develop an orientation program that incorporates adult learner concepts, is tailored to individual learning needs, and remains cost-effective.

Competency-based orientation, a component of a complete competency-based staff development program, offers a viable solution to this challenge. In this program, the learner's needs are assessed and the orientation is tailored to meet those specific individual needs. Confirmation of these needs through an objective process validates competency and guarantees successful staff development.(9)

The concept of a competency-based performance development program was first presented by Dr. Dorothy J. del Bueno at a 1977 nurse educator's conference. This concept focuses on three stages of learning: acquisition, application, and integration.(10) Acquisition involves the learner's active participation in the learning process. Application and integration are derived from the educator's use of reinforcement, feedback, and validation. A competency-based assessment tool is then utilized to validate performance outcomes.(8) Through research, del Bueno designed a program to test the theories of competency-based staff development and adult learning that adheres to JCAHO standards. The results of her work are marketed by Performance Management Services as the Performance Based Development System (PBDS).

A competency-based staff development program is an orientation, education, and management innovation that meets current and future JCAHO requirements to objectively measure and document RN competency. Through the use of a series of video and audio tapes, interactive role playing, slides, and games, PBDS assesses the knowledge and performance skills in three spheres: critical thinking, interpersonal, and technical. Assessment in these areas leads to a competency-based orientation that is individualized to the RN's needs and streamlined to maximize time and clinical experience opportunities. The assessment tools are utilized at three levels within the command: entry level, unit specific, and focused assessment. "Entry level" refers to the novice RN who is new to nursing, the Navy, the command, and a unit. The entry level assessment tool evaluates critical thinking, interpersonal, and technical skills for baseline medical-surgical knowledge and performance. "Unit specific" refers to skills required to function in a specialty area such as emergency nursing, orthopedic nursing, coronary care nursing, etc., and this tool evaluates these skills as appropriate. The third tool, "focused assessment," evaluates knowledge and performance in specific patient care categories or situations, i.e., the care of the cardiothoracic postoperative patient.

When used prior to orientation, these assessment tools identify individual learner weaknesses and define the technical, communication, and critical thinking skills that the RN must develop to function at a baseline competency level. Upon entry to a new command, a RN completes the entry level assessment. This assessment is rated and the baseline level validated and documented. If the nurse's baseline level is competent in accordance with the standards for that specific facility, orientation is minimal. The RN assigned to a critical care unit is assessed for baseline critical care skills and the orientation program for this RN is designed to meet only the learning needs identified through validation of the assessment. Again, the amount of time and man-hours expended in orientation is dependent upon the specific needs of that RN. Cost-effectiveness is realized in time and man-hour savings.

The use of PBDS has been documented to promote cost-savings and decrease nonproductive nursing hours through the reduction of unnecessary learning activities, clinical skills validation, and didactic course work.(1) Research has established that a competency-based staff development program is both cost efficient and improves the skills of the RN.(3,4) Ozcan and Shukla have both documented that a competency-based staff development program also increases the productivity of registered nurses.(9)

One study that compared traditional orientation with a competency-based orientation program realized a cost-savings of approximately $1,050 per RN.(7) Research also supports a noticeable increase in individual confidence and self-esteem simply related to being given "credit for what is already known."(11)

The ultimate goal of PBDS is to validate the presence of three essential components or a baseline competency level prior to "hands-on" patient care: critical thinking, interpersonal, and technical. If learning needs are identified by PBDS, an individualized learning plan and orientation is implemented to ensure patients receive the absolute best nursing care available in the most cost-effective and time-efficient manner. PBDS contains the tools to assess the following clinical areas: medical-surgical nursing, perioperative nursing, critical care nursing, obstetrical nursing, neonatal intensive care nursing, psychiatric nursing, and chemical dependency nursing.

A competency-based staff development program being implemented at Naval Medical Center (NMC) San Diego, CA, is the direct result of the lessons learned during Desert Shield/Storm. During this time, a large

group of reserve Nurse Corps officers augmented the medical center staff. These experienced nurses as well as other reporting active duty nurses were frustrated by the standardized orientation program that did not address their individual learning needs. Additionally, this "assembly line" orientation had no mechanism to validate the competency of new graduate nurses reporting aboard. Using the traditional orientation, new graduates and experienced nurses received the same type of orientation.

LCDR Mary Greenwood, NC, a clinical consultant, identified the need for competency-based orientation, and researched del Bueno's concepts of competency-based education. This research led to the Performance Management Services company which markets the PBDS.

LCDR Greenwood collaborated with the clinical consultants at NMC San Diego who recognized the tremendous staff development potential of this program. The group introduced the concepts to CAPT Barbara O'Brien, NC, director of nursing services, to garner support and guidance to pursue obtaining this program. The investigation of available resources to bring a competency-based staff development program to NMC was launched. Product availability research revealed that the only product currently on the market that achieved the goals of a competency-based system was PBDS.

The cost of PBDS for a facility the size of NMC San Diego is approximately $160,000. The concepts of competency-based orientation and the PBDS project were presented to the command's Executive Steering Committee (ESC) for funding consideration, and the ESC recognized the long-term value of this program. Third party payer funds for the purchase of PBDS were authorized. In August, PBDS was purchased and on 29 Sept 1993 the 14-month implementation phase of competency-based staff development (PBDS) began at NMC San Diego. del Bueno, in the consultant role, presented a half day workshop for all hospital administrators, managers, and other key personnel.

Competency-based performance development programs such as PBDS will eventually replace the assembly line form of orientation that does not consider the knowledge, experience, or expertise of a given individual. NMC San Diego is the first DOD health care facility to implement a competency-based performance development program. Although PBDS is designed for facilities with greater than 250 beds, a scaled-down version called Criteria Based Skills Assessment (CBSA) is available for smaller facilities.

Research has been initiated at NMC San Diego to compare the cost-effectiveness of the traditional form of orientation to a competency-based orientation (PBDS) within a MTF. The initial funding of $160,000 for a large facility and $30,000 for facilities with less than 250 beds represents a significant purchase for any MTF. In addition, supportive hardware such as monitors, video players, and computers add additional cost. Completion of the current research that investigates the cost-effectiveness within the military system of competency-based staff development as compared to traditional orientation practices should provide valuable empirical support for the possibility of implementation of the program known as the Performance Based Development System across DOD. However, sufficient research already indicates that the potential value of competency-based staff development cannot be ignored in this environment of reduced budgets, down-sizing, and health care reform.

For additional information regarding competency-based performance development or the PBDS, contact CDR Christopher Laurent, Project Coordinator, NMC San Diego, at DSN 522-6412 or Commercial 619-532-6412.

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CDR Laurent is currently the project coordinator for PBDS at Naval Medical Center, San Diego, CA. CDR Johnston is the Executive Assistant, Nursing Administration and is responsible for the assignment of all nursing personnel at Medical Center, San Diego. LCDR Greenwood is now the Clinical Nurse Specialist in the emergency department at Naval Hospital, Camp Pendleton, CA.

Naval Health Sciences Education and Training Command (HSETC) Highlights

●AFHPSP

More than 350 members of the Armed Forces Health Professions Scholarship Program (AFHPSP) added a second stripe to their shoulder boards this spring as they graduated from their professional schools and advanced to lieutenant. Of the 373 new doctors, dentists, and optometrists, 299 reported this summer to Navy and Army medical facilities to begin their active duty. The remaining 74 graduates received partial or full deferments from active duty to perform civilian internships and residency programs in medicine. The AFHPSP was established by Congress in 1972. Navy members are commissioned as ensigns in the Naval Reserve while attending an accredited civilian medical institution. The Navy pays full tuition, required fees, and a pretax monthly stipend of $824; the program also reimburses students for required textbooks and equipment. One year of active duty service obligation is incurred for each year of scholarship program participation, with a minimum 3-year payback. AFHPSP members execute one 45-day annual training period for each year of scholarship participation. Training includes the 1-week Officer Indoctrination School (OIS) in Newport, RI, and rotations or research clerkships at naval medical facilities. Students usually perform at least one naval rotation in lieu of third- and fourth-year school rotations. Members who complete OIS are eligible for a shipboard or Marine Corps orientation. This summer, five ensigns will report to USS *Eisenhower* (CVN-69) and USS *Roosevelt* (CVN-71) for training. Like their peers at the Uniformed Services University of the Health Sciences (USUHS), medical students submit applications to the Joint-Service Graduate Medical Education Selection Board in November of their fourth year for Navy internship selection. The board also grants a limited number of civilian deferments at this time. Dental and optometry students are detailed directly into their first active duty billet; for dental students, a professional board selects a limited number of applications for direct entry into a dental residency. Active duty members interested in more information about the AFHPSP should see their Navy Command Career Counselor or refer to the SECNAVINST 1520.8 series. Civilians should visit their local Navy recruiter.

●Medical Education and Training

CAPT James F. Bates, commanding officer, HSETC, convened a Strategic Planning Conference 11-15 May 1994 in Herndon, VA, to establish goals for Navy Medical Department education and training. The 37 participants included representatives of the Bureau of Medicine and Surgery, and of HSETC and its training commands and detachments. Eleven goals were developed which will serve to focus training efforts and resources for the next 7 years. The goals, in priority order, are:

(1) Develop a proactive planning and analysis system for Navy medical education and training.

(2) Obtain degree, certification, and affiliation (enlisted training).

(3) Develop and implement an effective academic measurement and evaluation system.

(4) Be proactive in procurement and utilization of modern facilities. Be proactive in procurement and utilization of modern technologies.

(5) Attract and retain the best possible staff.

(6) Determine and meet the requirements for operational readiness (training).

(7) Improve selection of quality students to maximize use of training resources.

(8) Streamline Navy medical education and training structure.

(9) Establish a culture where staff and students can flourish.

(10) Aggressively pursue Navy goals and objectives in joint and combined education and training efforts.

(11) Develop and deliver education and training programs that build a strong enlisted force.

Working groups are developing strategies for each goal. The final plan will be presented at the Surgeon General's Leadership Conference in the fall. HSETC will convene an annual conference to revisit and revise the plan. For further information contact Dr. B. Colletti, HSETC Quality Advisor, at DSN 295-2379, FAX 301-295-1783, or Commercial 301-295-2379.

A typical liberty boat landing

Fatal Ethanol Intoxication at an Overseas Liberty Boat Landing

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Medical personnel assigned to operational units encounter the full spectrum of alcohol-related disease.(1,10) Alcoholism is associated with many acute and chronic medical conditions which constitute a significant portion of primary medical care.(3) Most medical encounters with the alcoholic patient will not be life threatening but fatal outcomes are possible from the acute effects of alcohol abuse, as was recently demonstrated at an overseas liberty port.

Report of a Case

A 41-year-old PO1 (E-6) with 18 years of active service was assigned to an aircraft squadron deployed on an aircraft carrier in the Mediterranean Sea. He had completed 6 weeks of inpatient treatment for alcoholism approximately 5 years previously, after a conviction for driving under the influence ("DUI"). His medical record noted that he had returned to drinking within 3 months of completing the inpatient program, but no further aftercare had been initiated despite several medical officer evaluations. His family history was significant for alcohol abuse in an uncle. Life stressors included his daughter's imminent delivery of his first grandchild and the perceived lack of trained personnel in his work center, which required extra work. The ship was anchored out at the first port visit which coincided with the Christmas holiday season, and was 1 month into a 6-month Mediterranean deployment.

The sailor rode a liberty boat ashore in the midafternoon. He was observed to drink approximately one liter of hard liquor when his shipmates felt he was becoming too intoxicated to remain ashore. He was escorted back to the fleet landing, arriving at 2130 and requiring a pole litter to carry him from the bus. Due to his obvious intoxication, a beach guard hospital corpsman prevented him from returning to the ship on the liberty boat. Ship's policy required personnel to be able to safely egress from a sinking liberty boat prior to being embarked. The hospital

corpsman had the patient placed recumbent on a pole litter and monitored the patient at 15- to 30-minute intervals through assessment of pulse and respiration. The hospital corpsman expected the intoxicated sailor to sober up and then be returned to ship, according to usual procedures.

At 2330, the hospital corpsman noted the patient had normal pulse and respiration. At 0100, the hospital corpsman was unable to identify pulse or respiration so he began cardiopulmonary resuscitation (CPR) procedures. The patient was transported to the ship with CPR under way. There, the patient was evaluated by a medical officer who endotracheally intubated him for airway control. The patient was transported to a local hospital with Advanced Cardiac Life Support (ACLS) procedures under way. The patient was pronounced dead after resuscitative measures were unsuccessful at the hospital. His autopsy noted the causes of death as acute alcohol intoxication (BAL 451.6 mg/100 ml) and aspiration of gastric contents.

Discussion

Ethanol abuse is a common problem in the military, particularly overseas or when away from family support structure. It poses a significant problem in Navy operational medicine. In the United States, an estimated 105,000 people die annually from alcohol-related causes, which is 4.9 percent of total national mortality.(8) Alcohol-related deaths account for 1.5 million years of productive life lost (YPLL) before age 65 and more than 2.7 million YPLL of life expectancy.(8) The alcoholic patient has been reported to be 9.5 times more likely to die than community-matched controls.(4)

This case demonstrates several important considerations for medical personnel supporting operational units. The intoxicated patient requires careful evaluation, and severe intoxication should be considered a medical emergency.(6) The intoxicated patient who is comatose requires special attention for airway management and respiration, as this case illustrates.(3,6) Serum ethanol levels above 400 mg/100 ml in the acutely intoxicated patient have been reported to cause loss of consciousness and respiratory depression.(1,3,6) Successful resuscitation have been reported with serum ethanol levels of 700 mg/dL and 1,500 mg/dL.(5,7)

The case demonstrates the importance of medical department personnel involvement in the diagnosis and ongoing followup of alcohol problems in the active duty population. Routine medical evaluations offer the opportunity to note alcohol abuse/dependence, and to document aftercare requirements. Present Navy guidance on alcoholism does not allow patients diagnosed with alcohol dependence to return to drinking after treatment.(2) Patients with recurrence of alcohol problems should have counseling and referral, with medical involvement in tracking. In this case, such referral might have returned this sailor to the command-sponsored alcohol treatment program and prevented the eventual outcome.

Finally, the case illustrates the medical complexities which may be encountered by personnel supporting liberty boat landings overseas. Sailors in overseas liberty ports may be more at risk than when under way, particularly from alcohol-related problems, motor vehicle accidents, and unfamiliarity with local customs. Medical care for sailors as they return to the liberty boat landing may be hampered by unexpected life-threatening emergencies, communication difficulties, lack of ready medical backup, and uncertainty about medical resources in a foreign port. Medical personnel supporting liberty boat landings must be experienced and well briefed for various possible conditions. Even then, medical complications may quickly exceed their capabilities, as this case demonstrates.

Medical personnel in operational units are likely to encounter the entire spectrum of ethanol abuse. The acutely intoxicated patient requires thorough evaluation with careful attention to airway control and respiration to prevent fatal outcomes. Medical corpsmen supporting liberty boat landings must be prepared to handle a variety of medical problems including alcohol-related problems.

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Navy Medicine July-August 1944

Jennifer Mitchum

In July, the U.S. forces continued on toward the Philippines and Tokyo. Army troops landing at several points in New Guinea including Noemfoor Island in the Cape Sansapor area, and on Middleberg and Amsterdam Islands. Meanwhile the Saipan operation which began in June, was winding down with organized resistance ending 9 July. Taking Saipan proved more difficult than planners predicted with 16,525 American casualties.(1)

In addition to treating U.S. servicemen, Navy medical personnel on Saipan had to care for large numbers of civilians and POWs. About 16,000 Japanese, Korean, Chamorro, and Kanaka natives were interned; 10 percent suffered from wounds and/or illnesses.(2) The death rate was over 30 percent.(3) In a letter to Surgeon General VADM Ross T. McIntire, ADM W. Chambers described the task. "This internees camp was one of the biggest problems from a medical standpoint as limited medical personnel from field units had to be diverted to this work," wrote Chambers. "All of this in addition to caring for our own and enemy prisoners of war wounded,"(4) he added.

The Civilian Affairs Unit (CAU), consisting of a surgeon from the public health service and a pharmacist's mate first class, went ashore in June with field medical kits to care for civilians. Because there were so many in need of care, additional medical personnel joined CAU and helped the unit locate Japanese medical supplies that could be used in treating internees. In July, the Army set up a 500-bed hospital in the internment camp, but the facility did not suffice, for internees crowded the sick bay at a rate of 950 per day.(5) Many POWs received treatment aboard ships.

Tinian

On the morning of 24 July, marines on Saipan crossed the narrow strait and landed on the northern end of Tinian. Although met with light rifle and mortar fire, the troops soon established a beachhead. The Japanese had concentrated their defenses around Tinian Town on the southern end of the island.

Medical companies—each equipped with two 1-ton trucks, five jeep ambulances, and a reconnaissance jeep—went ashore and began rendering first aid, evacuating wounded, and setting up facilities.(6)

A corpsman administers blood plasma to an injured leatherneck on Tinian while he awaits transportation to a hospital ship offshore.

On 27 July, the Second and Fourth Medical Battalions established a 1,250-bed surgical hospital.(7) Moreover, two LSTs (landing ship, tank) served as surgical hospitals until the fourth day.

Evacuation

Initially, Navy medical personnel evacuated casualties from the beach to LCVPs (landing craft, vehicle, personnel) and then to transports which carried them to Saipan. Subsequently, critically wounded were transferred to the hospital ship USS *Relief* (AH-1) and the hospital transport USS *Tryon* (APH-1); others were also taken to field hospitals. After the fourth day, high seas threatened seaward evacuation and air evacuation was inaugurated. Approximately 1,500 patients flew from Tinian's Ushi Point airfield to Saipan.(8)

Offshore Struggle for Tinian

During the initial assault, enemy shore batteries pounded attacking vessels and scored many hits. USS *Colorado* (BB-45) suffered 22 hits within 15 minutes resulting in 241 casualties, with 43 dead and/or missing.(9) One hit devastated the sick bay, injuring the senior medical officer.(10)

Crewmembers brought wounded to collecting stations. Many suffered from hemorrhages, compound fractures of the extremities, and soft tissue injuries. Doctors and corpsmen tried to control bleeding, checked for shock, administered plasma, and splinted fractures. Medical personnel also applied petroleum jelly to burns and dusted lacerated soft tissue wounds with sulfanilamide powder before bandaging them. Subsequently, patients were transferred to emergency wards on the second deck.

Despite turmoil, the ship's crew performed admirably. As testament of their courage, there were reports that men who had had a hand or foot blown off, continued to man their stations instead of seeking medical treatment. Consequently, many of them bled to death.(11) That evening the severely wounded were transferred to *Tryon* for definitive treatment.

Sanitation and Disease

Because of rapid troop advance and limited supplies and personnel, it was difficult for disease control units to institute effective sanitation measures. Although Tinian was free of malaria and filariasis vectors, the island was infested with flies and other insects. There were such vast hordes of flies that ships, anchored offshore, reportedly fired directly at them to discourage their activity.(12) Flies preyed on food supplies which resulted in the outbreak of debilitating enteric diseases.

Combat fatigue and other forms of neurosis also claimed many victims. Although he lacked psychiatric training, Navy doctor Jack Ewing worked with patients on Tinian who had cracked under strain of battle. He commented about the causes of psychoneurosis saying, "There are many casualties in a war that have nothing to do with fighting or a fear of death. Sometimes worry and fear of what is happening at home can be worse than fear of battle."(13) After the war, Dr. Ewing became a psychiatrist and believed the war advanced medical knowledge in many ways. "There were new operational techniques and new medicines," he said adding, "And certainly society's understanding of mental health was advanced by fifty years."(14)

Those suffering from diseases such as dengue, dysentery, and combat fatigue totaled well over a thousand in both the Fourth and Second Marine Divisions.(15) Moreover, several men had acquired malaria prior to the Tinian operation.

Tinian Secured

By 2 Aug, Tinian was secured. American casualties were considerably less than on Saipan with 290 killed, 1,515 wounded, and 24 missing. On the other side, 6,050 Japanese were killed and 255 captured. Navy medical casualties were comparable; 52 members of the Fourth Marine Division's medical complement became casualties.(16)

A total of 10,676 civilians were interned.(17) Navy medical personnel, assisted by native nurses, attempted to provide the best possible care with limited supplies and equipment. Thirty-two percent of those treated, however, died mainly from gunshot wounds but also from tuberculosis, eye diseases, helminthic infections, tetanus, pneumonia, gas gangrene, and malnutrition.(18)

Guam

In December 1941, the Japanese had wrested Guam from American control. Thirty-two months later the island would be the first captured U.S. territory liberated from the enemy. One hundred miles south of Saipan and Tinian, Guam was defended by a garrison of 19,000 men concealed in defenses which included dug-in artillery, bunkers, and underwater obstacles. Prior to committing troops, American sea and air forces heavily bombarded Guam.

On 21 July, troops went ashore on the northeast and west coasts of the island. Facing fierce mortar and machine gun fire, casualties piled up quickly. Beach party medical sections rapidly established first-aid and evacuation stations while battalion aid medical personnel set up near command posts, roads, trail, and behind natural barriers. With few jeep

The Navy's Hospital Transports (APHs)

During the Pacific campaign, it became readily apparent that existing hospital ships would be insufficient for evacuating casualties from battle zones to rear areas. Moreover, there was a shortage of transport shipping needed to ferry troops and supplies to the combat zones. To help fill both roles, the APH was conceived. Inbound to Pacific islands, these vessels would perform as armed transports. After offloading cargoes and troops, the APHs would then serve as casualty carriers. Subsequently, three ships were converted by installing medical facilities. However, unlike hospital ships, the APHs were not protected by the Geneva Accords.

These conversions began soon after Pearl Harbor. SS *Alcoa Courier* (MC hull 175), a passenger-cargo vessel of the modified C-2 design, was the first ship to be converted. Thus, the hospital transport USS *Tryon* (APH-1) was born. SS *Alcoa Courier*'s passenger spaces became hospital wards, and its officer accommodations and cargo compartments were altered to accommodate combat troops and equipment. Her swimming pool, passenger public rooms, and promenade decks were also eliminated.(1) Armament consisted of one 5-inch and 12 40mm guns.(2)

Similarly, SS *Alcoa Corsair* (MC hull 176) and SS *Alcoa Cruiser* (MC hull 177), both intended to be bauxite and passenger carriers, became USS *Pinkney* (APH-2) and USS *Rixey* (APH-3), respectively.

Commissioned the latter part of 1942, *Tryon, Pinkney,* and *Rixey* served as ambulance ships transporting patients between fleet and base hospitals in the South Pacific. Moreover, the ships participated in some of the most heated battles of the war including the Marianas, Iwo Jima, and Okinawa invasions. Aboard each hospital transport were highly trained Navy doctors and corpsmen. The 1943 medical record of *Rixey* testified to the exceptional training Navy doctors and corpsmen had received.(3) By the end of 1943, *Rixey*'s medical department of 71 officers and men had cared for over 10,000 patients and had lost only 3 in her travels between the Solomons, New Hebrides, New Caledonia, and New Zealand.(4)

Pinkney also amassed quite a record. Between January 1943 and April 1945, she steamed about 150,000 nautical miles (equal to six times around the world), made 180 ports of call, and transported over 35,000 patients and more than 65,000 troops.(5)—JM

USS *Tryon* (APH-1)

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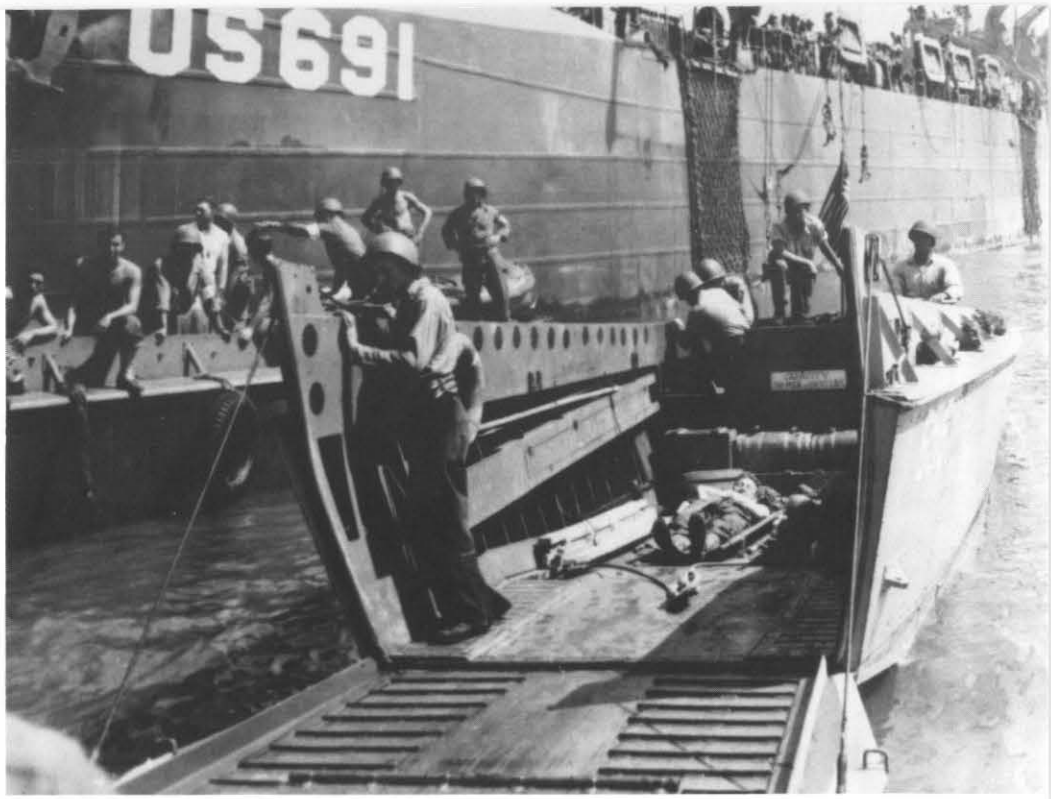

As LST-691 brings men and supplies to a beach in Southern France, LCU-656 carries a wounded man to a ship for treatment.

ambulances, Navy medical personnel often carried wounded over rugged terrain to aid stations.

Evacuations

Casualties were transferred from shore activities to hospital ships, transports, LSTs, and other craft. Some LSTs functioned as surgical vessels and had liaison, resuscitation, and surgical teams aboard. Liaison teams communicated with beach dressing stations while the resuscitation teams diagnosed injuries and dispensed initial shock treatment. Surgical parties rendered definitive treatment. Yet other LSTs, each staffed with a doctor and three corpsmen, operated as medical ships admitting mainly ambulatory, neurotic, and diseased patients.(19) Less than an hour after troops went ashore, casualties were brought aboard transports.(20)

The hospital transport USS *Rixey* (APH-3) lay off the coast of Guam serving as a floating field hospital. The third and last of its class, *Rixey* was staffed with about 10 medical specialists and over 60 corpsmen. The vessel had several operating rooms including those for orthopedic, general surgery, and ear, nose, and throat procedures. Acute wards were located in the ship's hold and rooms with three to five tiers of bunks served as ambulatory wards. Casualties received definitive treatment aboard the vessel before being transferred to other transports for further evacuation to Saipan.

Despite its unique features, *Rixey* was no luxury ship and Navy medical personnel worked under strenuous conditions. "The heat was terrible," recalled CDR Anthony De Palma, who was an orthopedic surgeon aboard *Rixey*. According to De Palma, temperatures sometime reached 106 degrees Fahrenheit down in the hold.

"We used to work in our skivvies...because it was so hot. The sick bay country was just inadequate but still we were taking care of hundreds and hundreds of casualties there." He performed 47 amputations during the Guam invasion.(21)

Hospitalization

In the northern area, two medical companies established the Third Marine Division field hospital. First, the hospital was set up in a ravine; later it was moved to the prewar U.S. Naval Hospital at Agana. Medical personnel often took up arms to defend themselves and their patients against enemy attacks. Once, the doctors, corpsmen, and ambulatory patients held off the Japanese until marines arrived to drive them off.

On southern beaches, the Third Corps Medical Battalion landed the afternoon of 23 July. Forced to dig in, they crowded into a small area for three nights before establishing a 250-bed field hospital near Agat.(22)

Sanitation

Because Guam had been a U.S. possession prior to the war, Navy medical personnel were familiar with the island's health and sanitation problems. Although free from malaria-bearing mosquitos, Guam was infested with dengue vectors, house flies, and other pests like crab lice, ticks, and mites. Congested, fly-infested native dwellings were breeding grounds for tuberculosis, yaws, leprosy, and typhoid. Clean water was also a major concern, for the island lacked natural purification processes and its sewage system was inadequate.

Disease control personnel, arriving 2 days after the invasion, began instituting sanitary control measures.(23) As early as 23 July, purification units were in operation, but water for bathing and other external needs remained scarce.

The Marines announced on 10 Aug that organized resistance had ceased. Although 11,000 Japanese had been killed, about 9,000 remained in small, isolated pockets scattered throughout the rugged terrain.(24)

Some would survive to menace Americans until the end of the war. U.S. casualties totaled about 1,400 and about 7,100 wounded. Of those killed, four were Navy doctors and 40 were hospital corpsmen.(25) Victory in Guam completed the Marianas campaign.

European Theater

In July, Allied troops pressed toward Paris in what proved to be a very difficult and bloody struggle. The fighting in the Norman hedgerow country slowed the advance. One key to the European operation was opening a deep-water port to provide a supply conduit for the Allies. Therefore, on 25 June, British and American battleships arrived off the port of Cherbourg and began shelling German fortifications in support of attacking American ground troops. But in response, enemy shore guns took a toll. USS *Texas* (BB-35) suffered at least 10 hits with one slamming into her fire control tower killing the helmsman and wounding almost all personnel on the navigation bridge.(26) Similarly, USS *O'Brien* (DD-725) suffered a direct hit which killed 13 and wounded 19 others.(27) After 3 hours of intense shelling, however, Cherbourg fell, except for a few isolated forts.

Casualty Care

By 5 July (D+29 days), American casualties totaled 23,377.(28) Most of these casualties were evacuated from the beaches. Subsequently, most casualties were transported via LSTs to medical facilities in England. One facility was U.S. Naval Base Hospital No. 12 in Netley, England, which initially served as a receiving hospital. Doctors and nurses at Netley had worked long hours removing bullets and shrapnel, performing debridement, and administering lifesaving drugs like penicillin. The casualty flow to Netley decreased as the Army established medical facilities in France.

Southern France

On 15 Aug, U.S. Army troops went ashore in the Toulon-Cannes area of the Mediterranean coast. Initial casualties were relatively light.(29) The Army cared for casualties on land and subsequently transferred them to Navy evacuation stations. After rendering first aid, Navy medical personnel evacuated casualties to transports and hospital ships which transported them to medical facilities in Naples, Italy, and Oran, Algeria.(30) After 41 days ashore, the Navy had suffered a little over 300 casualties.(31)

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Selective Decontamination in the Prevention of Infection After Irradiation

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Accidental or war-related exposure to radiation poses significant danger to military and civilian personnel. Ionizing γ radiation depresses normal host defenses and enhances the susceptibility of the immunocompromised host to local and systemic bacterial infections (1). There is a practical need to develop effective therapeutic modalities for infections following radiation injury.

No large-scale clinical studies have established the principles of management of patients exposed to radiation. However, the experiences gained in caring for patients exposed to radiation, including Chernobyl patients, indicate that their infections and their management are similar to the ones of febrile granulocytopenic patients who have malignancies. Early empirical antibiotic therapy has become standard practice for the initial management of these patients and has contributed significantly to their improved outcome.

Mechanical and thermal wounds are often colonized by organisms that originate from the gastrointestinal flora. These organisms reach the wound site either by contact or through systemic spread, sometimes termed as translocation.(2) Since the gastrointestinal tract (GIT) is the major source of the infection seen in patients who are immunocompromised by chemotherapy or irradiation,(3) a logical approach to reducing the incidence of infection is through suppression or eradication of the endogenous gastrointestinal gram-negative flora.(4) Studies have used prophylaxis with nonabsorbable(4,5) and absorbable(6) antibiotics that selectively decrease the number of the *Enterobacteriaceae* flora and preserve the anaerobic flora.

Effect of Antimicrobial on the GIT Flora

The potential importance of preserving the normal anaerobic flora of the gut was illustrated in several studies that demonstrated the adverse effects of antimicrobials affecting that flora.(7,8) Therefore, the use of wide-spectrum antimicrobials that possess antianaerobic activity may have deleterious effects on the irradiated host.

Treatment of mice with oral antibiotics that suppress the multiplication of anaerobes (penicillin, clindamycin, and metronidazole) increased the population of gram-negative enteric bacteria and was associated with increased translocation of these organisms to mesenteric lymph nodes.(7) Decreased resistance to colonization with gram-negative bacteria during treatment of mice with four broad-spectrum antibiotics: azlocillin, mezlocillin, cefuroxime, and moxalactam was also described.(8)

We(9) demonstrated the occurrence of earlier mortality in lethally irradiated mice that were treated with metronidazole following irradiation. In contrast, gentamicin or ofloxacin therapy had a beneficial effect on survival. The predominant organism recovered from the blood, spleens, and livers of these mice was *Enterobacteriaceae.*

Changes in Flora Following Irradiation

Exposure to a lethal dose of ionizing radiation induces a dose-related reduction in the number of both aerobic and anaerobic bacteria from 10^{10-12} to 10^{4-6} gram stool within 4 days.(9) While the number of anaerobic bacteria stays low, the number of *Enterobacteriaceae* increases significantly up to 10^9 by the 12th day following radiation. This increase is associated with bacterial translocation of these organisms and associated with fatal bacteremia. Isolation of *Enterobacteriaceae* from the tissues of mice treated with metronidazole, penicillin, or vancomycin was associated with a more rapid decrease in the number of the gastrointestinal anaerobic flora followed by a more rapid increase in the number of aerobic and facultative organisms as compared to untreated irradiated mice. In contrast, gentamicin or ofloxacin therapy reduced the decline in the anaerobic flora.

Since the exposure to high levels of radiation induces severe changes in the mucosa of the gastrointestinal tract, the increased number of *Enterobacteriaceae* may easily penetrate the physically or immunologically damaged mucosa. Antimicrobial agents that suppress anaerobes may facilitate the reduction in the number of anaerobes that is normally observed in all irradiated hosts. This reduction induces a more rapid mortality due to gram-negative septicemia.

Antimicrobial agents effective against a wide spectrum of microorganisms may, however, be needed to treat severe infections, especially those associated with intra-abdominal trauma. Therefore, further studies are needed to provide guidance regarding the judicious use of these agents in the irradiated host and to devise therapeutic modalities that will circumvent their deleterious effect on the anaerobic gastrointestinal flora.

Decontamination in Immunocompromised Patients

Total decontamination of the gastrointestinal tract was attempted in granulocytopenic hosts using a combination of several antimicrobials that possess activity against aerobic gram-positive and gram-negative bacteria as well as fungi. A combination of gentamicin, vancomycin, and nystatin with or without topical antiseptics was often used.(3,10) Several randomized prospective controlled studies assessed the effect of prophylactic nonabsorbable antibiotics (PNA) in granulocytopenic patients. Whereas some studies(5) showed no significant decrease in infection rate in patients with leukemia, other studies(11) demonstrated a decrease in infection in the patients who received PNA.

The addition of a protective environment (PE) to the use of PNA was evaluated in five studies.(3,4,10-12) Three studies totaling 249 patients(3,11,12) showed decreased infection in those treated with PNA plus PE. One study(10) of 64 patients showed a decrease in infection in those who received PNA plus PE as well as those getting PNA only. Another study(4) of 82 cases showed no significant decrease in infection rate.

Selective Decontamination in Immunocompromised Patients

Selective decontamination (SD) attempting to eradicate only the aerobic gram-negative bacilli by using absorbable agents has gained increased interest. This approach uses trimethoprim/sulfamethoxazole (TMP/SMZ) or quinolones. It is less costly than attempting total decontamination, and because of the partial absorption of the antimicrobials, it enables the eradication of gram-negative organisms that might reach the bloodstream.

Several studies evaluated the efficacy of TMP/SMZ in reducing the infection rate in granulocytopenic patients. The combination of TMP/SMZ was used alone in three studies in a total of 169 individuals.(13-15) Decreased infection rate was found in the treated patients compared to the untreated individuals. Therapy with TMP/SMZ is often associated with appearances of TMP/SMZ-resistant organisms.(13) Furthermore, a possible delay in bone marrow recovery (expressed also as a prolongation of neutropenia and a high number of allergic reactions) has been demonstrated.(6)

Quinolones in Selective Decontamination

The newly introduced quinolones hold promising potential for use in SD. These agents exhibit broad antimicrobial activity against aerobic gram-positive and gram-negative bacteria, especially against *Enterobacteriaceae* and *P. aeruginosa,*(16) and they have limited activity against *Bacteroides* sp. and *Clostridium* sp. Norfloxacin therapy eliminated members of *Enterobacteriaceae* from the intestinal tract of 12 volunteers and reduced colonization resistance in only 2 of 12 (14 percent).(17) The counts of anaerobic bacteria were not altered when a low dose of the drug was used.

Ciprofloxacin rapidly eliminated *Enterobacteriaceae* in the gut flora of 15 patients with acute leukemia, during the 42 days of therapy, while *Bacteroides* sp. and *Clostridium* sp. were not affected.(18). No gram-negative infections were noted, and most of the infections that occurred were due to gram-positive cocci, especially *Staphylococcus epidermidis.*

These agents can also be administered orally and are relatively free of serious side effects. The quinolones are also effective in the management of septic episodes in neutropenic patients.(17,18) Furthermore, selective decontamination of the gut with orally administered quinolones prevents sepsis in immunocompromised hosts.(17,18)

Quinolones in the Prevention of Mortality After Irradiation

We used quinolone antimicrobial agents to treat infections in irradiated mice and to show that these agents effectively control systemic endogenous gram-negative infection after irradiation.(19) Therapy given for 21 days following irradiation was superior to a 7-day therapy.(20) Supplementing quinolone therapy with penicillin prevented treatment failures due to Streptococci.(21) A significant reduction was noted in

the animals treated with quinolones in the number of *Enterobacteriaceae* in the colon, and the associated bacteremia due to these organisms. Quinolones were also effective in management of systemic exogenous infections due to orally ingested *Klebsiella pneumoniae* and *P. aeruginosa.*(22,23)

Oral gentamicin administered shortly after ingestion of bacteria prevented gastrointestinal colonization, bacterial translocation, and mortality due to *P. aeruginosa* and *K. pneumoniae* in irradiated mice.(23) Because oral gentamicin was not absorbed through the gastrointestinal tract, it is postulated that gentamicin prevented bacterial sepsis because it inhibited the colonization of the gastrointestinal tract by the inoculated bacteria. However, when gentamicin administration was delayed for 6 to 18 hours colonization and bacterial translocation had taken place, administering gentamicin orally was ineffective. In contrast, intramuscular administration of gentamicin even at a later stage successfully reduced both systemic spread of the bacteria and gastrointestinal colonization. Orally administered ofloxacin also achieved these results even when it was given at a later stage, thus showing the ability of the quinolone to achieve suppression of both intestinal colonization as well as bacterial translocation.

The effectiveness of quinolones may be attributed to their ability to locally inhibit the ingested organism's growth in the gut lumen, while preserving the anaerobic gut flora, and to their system antimicrobial efficacy. Quinolone therapy can therefore control the gram-negative growth in the gastrointestinal tract that follow irradiation and subsequent sepsis, thus preventing *Enterobacteriaceae* translocation and mortality. Oral as well as parenteral administration, the ability to selectively inhibit potential pathogens in the gut, and the ability to treat systemic infection make the quinolones promising agents for therapy of endogenous and exogenous infections after irradiation. Although their use in selected cases of irradiation victims may be beneficial, future studies are needed to ascertain the potential large scale use of these agents, and whether their wide use in selective decontamination will select bacterial resistance.

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Aerobic Fitness, Gender, and Motion Sickness Susceptibility:

A Brief Review

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Motion sickness is a condition characterized by nausea, vomiting, pallor, and cold sweating,(27) that occurs when an individual is exposed to real or apparent motion stimuli with which they are unfamiliar and/or unadapted.(4) A correlation between aerobic fitness and increased susceptibility to motion sickness was first reported by Whinnery and Parnell.(55) While evaluating the effects of long-term aerobic conditioning on $+G_z$ tolerance, a significant incidence of motion sickness symptoms was observed in aerobically fit subjects. Subsequent investigations revealed that men with a high level of aerobic fitness appeared to have an increased susceptibility to motion sickness.(3,13) Cheung, Money, and Jacobs(13) evaluated susceptibility to motion sickness in initially unfit subjects before and after an endurance program. Their results indicated a significant increase in motion sickness susceptibility after aerobic training, suggesting the possibility of a causal relationship between aerobic fitness and motion sickness susceptibility. A preliminary study, conducted by Christopher and Hatler(14) examined the effects of low to moderate levels of aerobic conditioning on motion sickness susceptibility in females. This investigation reported that females with low to moderate aerobic conditioning do not appear to have an increased susceptibility to motion sickness.

Whiteside(56) stated that motion sickness could be induced in a generalized population if the causal accelerations are of sufficient intensity and duration. Although the intensity and frequency of the stimulus are contributing factors for the development of motion sickness, the individual predisposition cannot be ignored. Several investigators have claimed that an individual's sex contributes

to susceptibility. It is reputed that females are, on average, more susceptible to motion sickness than males.(1,4,8,12,26,33,35,42,44,45,47) While the basis of these effects remain unknown, it is possible that several neural and endocrine factors may subserve motion sickness susceptibility. The literature examining motion sickness has illustrated the etiologic heterogeneity of this condition. However, an emerging body of data suggest that the presence of particular physiologic variables may define high susceptibility responders to motion; these variables are aerobic conditioning and gender.

A personal history motion sickness questionnaire was developed by Reason(44) as an alternate means of evaluating individual vulnerability to motion sickness. In a survey study of 150 female and 150 male university students, females reported a significantly higher incidence of motion sickness than their male counterparts.(44) While the cause for this difference has not been determined, certain possibilities exist. First, it may be that females more readily admit to having motion sickness. Second, Benson,(4) Kaplan,(33) and Schwab(47) have reported that females appear to be more susceptible during menses and pregnancy.(4,8,42) Common to these findings is that phasic changes in hormonal status (i.e., the phasic gonadal hormone pattern of (a) females vs. the tonic gonadal hormone pattern of males, and (b) menstruating females vs. nonmenstruating females) could affect motion sickness susceptibility. Exacerbated phasic hormonal variations have been noted in trained females following aerobic exercise.(54) Taken together, such findings suggest a possible mechanistic relationship between gender, aerobic fitness, and motion sickness susceptibility that is reliant, at least in part, upon neuroendocrine variables.

The existence of endogenous neurochemical substances in the central nervous system with opiatelike properties was demonstrated in 1974 and 1975.(23,30,31,43,51,52) Two opioid pentapeptides, methionine and leucine enkephalin were isolated and purified.(30) Previously, researchers isolated peptides derived from beta-lipotropin in the anterior pituitary that also exerted potent opiate action.(36) These peptides were called alpha, gamma, and beta-endorphin.(37)

Several investigators have reported that serum concentrations of endogenous opioids, primarily beta-endorphin, increase in response to exercise. (5,7,9,10,11,15,17,18,19,20,21,29,40,46,49) The increase of beta-endorphin in exercising males and females has been reported to be as high as five times the basal level.(17) Although opposing opinions exist, there is a large body of evidence to support that circulating endorphins produce a state of euphoria as a consequence of progressive exercise intensity. Other possible implications of endorphin-induced effects include pain tolerance,(5,25) mood changes,(17) and menstrual cycle changes.(6,39)

Both beta-endorphins and adrenocorticotrophic hormone (ACTH) originate from the same metabolic precursor, pro-opiomelanocortin.(16,38,48,49) Beta-endorphin and ACTH are simultaneously released from the pituitary in response to stress(24) (including exercise).(29,49) Banta et al.,(3) suggested that an altered neuroendocrine state may have contributed to the heightened reactions of aerobically fit subjects to sensory conflicts induced by Coriolis cross-coupled stimulation. Cheung, Money, and Jacobs(13) reported that the stress of motion sickness caused the release of several hormones including ACTH.

Endogenous opioids produced during exercise degenerate at a slower rate in the blood of trained individuals compared to untrained individuals.(32) This may support the stress hormone response hypothesized by Banta et al.(3) Cheung, Money, and Jacobs(13) suggested that ACTH may play a significant role in susceptibility to motion sickness. Aerobic fitness-induced changes in stress hormones may be even greater in females due to the

Definition of Terms

Aerobic Fitness: The ability to acquire, transport, and utilize oxygen, and is measured by testing maximal oxygen uptake ($VO_{2\ max}$). (2,50, 53)

Coriolis (cross-coupled stimulation): Stimulation of the semicircular canals when an individual who is being rotated about a particular axis, moves their head in a plane other than in the plane of the imposed rotation.(4)

Maximal Oxygen Uptake ($VO_{2\ max}$): The rate at which oxygen can be maximally acquired, distributed, and utilized by the body in the performance of work.(2,28)

+G_z (Positive G): Occurs when the accelerative force acts to move the body in a head to foot direction as when one is standing erect. The inertial force is toward the feet and the body is forced down into the seat.(22)

synergistic effects of gonadal hormones on central neuroendocrine systems.

As noted, several investigators have reported that beta-endorphins and ACTH are released simultaneously by the pituitary in response to stress. This would suggest that beta-endorphins may have a concomitant role in aerobic fitness and motion sickness susceptibility. It is interesting to question whether aerobic fitness and gender-related alterations in hormone levels (opiods, ACTH) may potentiate motion sickness susceptibility. The role of opioids in motion sickness may not be direct. Studies have elucidated the neuromodulatory effects of beta-endorphin (and other opioids) on several neural systems,(16) including the brainstem noradrenergic and serotonergic systems. These neurochemical systems function synergistically to modulate sympathetic "tone" and have been shown to mediate the cardiovascular system and affective response to excessive vestibular input (i.e., rapid changes in movement).(34) It is possible that exercise and fender-induced changes in basal ACTH and opioid levels may affect noradrenergic and serotonergic neurochemistry at several loci, including vestibular, sympathetic, and/or chemosensitivity/emetic neuraxes to produce changes in motion sickness thresholds.

While these variables may be salient and contribute to motion sickness susceptibility in particular individuals, it is not clear whether their effects are coterminal, or an epiphenomenon to other predispositional physiologic factors. It should be noted that motion sickness is individually variant, and many other etiologic bases have been described.(4,14,45) However, the factors described in this report may be useful to identify certain individuals who are resistant to conventional motion sickness desensitization attempts. As increased numbers of female aviators enter fleet service, a larger data base can be assembled to assess these variables, and interventive steps can be taken to diminish their effects (i.e., amend fitness programs, isolate periods of heightened motion sickness vulnerability, and increase motion sickness training in concordance with these factors.) Clearly, further research is warranted to identify physiological conditions that may be manipulated to improve aviator performance.

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Naval Medical Research and Development Command Highlights

●Liposome Encapsulated Hemoglobin

The Navy has had a long-standing requirement for red blood cell storage and transfusion capability as part of resuscitation protocols aboard ships and at forward echelons of combat medical care. Fresh donated blood must be refrigerated, requires crossmatching to minimize the ever-present risk of transfusion reactions, and can transmit diseases such as hepatitis, malaria, and AIDS. Liposome encapsulated hemoglobin (LEH), a promising blood substitute, is being developed by a team of Navy, academic, and industrial laboratories. LEH is hemoglobin (oxygen-carrying protein) encased in microscopic lipid droplets with walls similar to cell membranes. Current efforts focus on demonstrations of LEH efficacy (oxygen delivery), safety (immune response and vasoactivity), and ability to manufacture the product on a large scale. LEH is formulated to be freeze-dried. Freeze-drying offers prolonged shelf life, reduced weight and volume, cost savings during storage and transport, and negligible processing prior to administration. The goal of this research effort is to generate the necessary scientific and manufacturing data required for application to the FDA for initiation of human trials by the turn of the century. For more information contact CDR P.D. Kent, MC, NNRDC Research Area Manager for Combat Casualty Care, DSN 295-0880 or Commercial 301-295-0880.

●Enterotoxigenic *Escherichia Coli* Vaccines

During Operation Desert Shield, 57 percent of personnel in ground units stationed in northeastern Saudi Arabia experienced more than one episode of diarrhea after 3 months deployment; 20 percent of those affected lost duty time. Enterotoxigenic *Escherichia coli* (ETEC) accounted for 30-60 percent of all diagnosed cases. Researchers in the Infectious Diseases Department, Naval Medical Research Institute (NMRI), Bethesda, MD, are working with researchers at the NMRDC OCONUS laboratories in Egypt and Indonesia to developed the test sites needed to evaluate the efficacy of a first generation combination killed whole cell-toxoid vaccine (a mixture of *E. coli* colonization factor antigens and the B subunit of the cholera enterotoxin) to determine the suitability of this product for FDA licensure and general use within a fleet and FMF. It is anticipated that ETEC vaccine studies will begin in Egypt in FY95 and shipboard vaccine trials could tentatively begin in late FY95 or early FY96. In more basic ETEC studies, NMRI researchers have carried out pioneering research aimed at further defining the full range of virulence factors associated with the pathogenicity of ETEC. To date, two new enterotoxins and a new adherence factor have been identified. It is anticipated that this work will help to improve the protective efficacy of second generation ETEC vaccine candidates. For more information contact CDR C.J. Schlagel, MSC, NMRDC Research Area Manager for Infectious Diseases, DSN 295-0881 or Commercial 301-295-0881.

●Diagnostic Kit for BW Agents

Scientists in the Biological Defense Research Program at the Naval Medical Research Institute, Bethesda, MD, are successfully developing a field deployable system for the identification of Biological Warfare (BW) agents. This system utilizes hand-held, flow-through screening immunoassays, which take 15 minutes to perform and are similar to pregnancy tests, for identifying a range of infectious BW agents and toxins in clinical and environmental samples. This unique BW agent identification system will also utilize field deployed, laboratory-based immunoassays and PCR assays linked to a sophisticated, semiautomated, electrochemiluminescent biosensor for the confirmatory identification of BW agents in samples. Biosensor-linked immunoassays can be performed in 15 minutes and are up to 1,000 times more sensitive than hand-held screening assays. Biosensor-linked PCR assays can be performed in the field in under 45 minutes. This approach utilizing far forward deployed hand-held screening assays and laboratory-based, rapid confirmatory assays for the identification of BW agents is the most comprehensive, specific, and sensitive system yet developed. For more information contact CDR C.J. Schlagel, MSC, NMRDC Research Area Manager for Infectious Diseases, DSN 295-0881 or Commercial 301-295-0881.

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